Live with floods in the Greater Paris. Flood risk integration in the landuse projects

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Abstract

My thesis is the result of a European research conducted since 2009 about the implementation of flood resilience. This research is multidisciplinary; it involves hard sciences and human sciences researchers. This experience was a first step to develop my PhD subject. Indeed, the interaction between hard and human sciences is a key to a better understanding of how the issue of floods could be appropriate by non technical specialists.

This research has to take into account the special context of the landuse in flooding areas in the Greater Paris, between a strong regulation and the real estate pressure.

Behind the technical aspects of flood risk, the risk integration by the stakeholders is a relevant aspect of the landuse. We will search if the flood risk is considered as a main issue in the execution of an urban project and in this way observe the integration of the risk throughout the project.

Keywords

Floods; landuse; urban project; management

INTRODUCTION

Despite the strong regulation concerning the building in flooding areas (Fig. 1), 80% of these areas are built and 828 100 inhabitants are exposed to floods in the Ile-de-France region (IAU, 2011), mainly because the buildings precede the regulation. The land use in flooding area is presented as a solution to solve the real estate pressure. For instance some of the industrial wastelands are along the river and are currently in redevelopment and residential buildings are planned. Moreover, in the Ile-de-France master plan[1] it is provided to build 60,000 accommodations pro year, in order to obtain 1.5 millions additional accommodations on the horizon 2030, we can deduce that the phenomenon of landuse in flooding areas will increase. This research fit into the special greater Paris framework (very dense and a strong lack of accommodation) and we have to take into account the metropolitan context as a matter of fact. In fact, we may ask ourselves if there is a place for flood integration in the metropolitan context. The regulatory context is mostly based on risk prevention plan, whereas there are more flood management tools, like the action plans for floods (PAPI). However with the implementation of the Flood directive since 2010, the objective is to homogenize the flood management policy and to make clearer the flood risk prevention and protection policy.

How human sciences (urbanism, geography, social sciences) could deal with flood risk. And how answer to the question: how the integration of the flood risk enables the implementation of

[1] in the draft version of 2008

an urban project. This paper will first present the context of the development of the PhD project. It will then introduce the methods used to answer to the core question. At last, we will show how first results can be turned into research hypothesis and lead to a new research question.

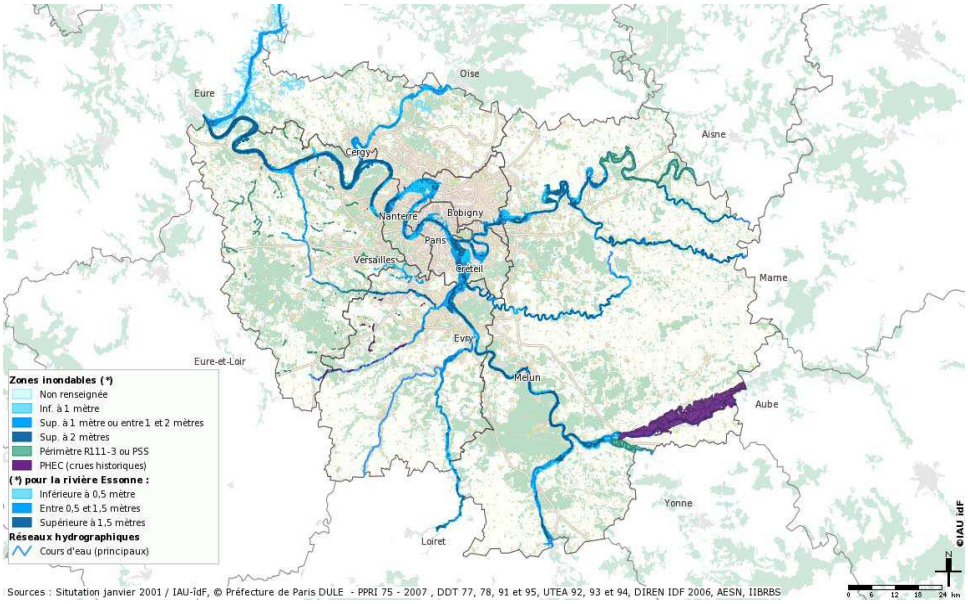

Figure 1 : Flooding areas in Greater Paris. Source: IAU Ile-de-France

THE FLOOD RISK THROUGH THE HUMAN SCIENCES

A European project: Smart Resilience Technology Systems and Tools (SMARTeST)

This European project is the first step of our research. This project began in 2009 and will end in December 2012. It involves seven countries Germany, United Kingdom, France, Greece, Cyprus, Netherlands and Spain. The purpose of the project is to find the "road to market" for flood resilient[2] tools, as barriers, non-return valves, demountables gates. In order to meet this objective, the project integrates hard sciences and human sciences to develop a flood resilient system. It's structured in five work packages, the first one is the management of the project, the second concerns the test of the flood resilient tools, the third is designing a flood resilient system, the forth is developing technology implementation tools and the fifth includes all the work packages to find the improvement of the flood resilient tools integration. I'm especially involved in the fifth, the one which including mostly human sciences researchers, with the description of stakeholders interactions and the development of workshops integrating stakeholders in order to find the best scenarios of flood resilient systems.

Each country chose a city to develop its research. In France, we chose the Greater Paris and especially the Bièvre River, the urban project Seine Rive Gauche in Paris and the "Orly-Rungis Seine Amont" area (in the west of the Val de Marne County). As human sciences researcher in the framework of the project, we have to describe the flood risk management in France, to conduct interviews with local authorities, associations, cities services and to organize workshops about flood resilience integration. Along the project hard sciences and human sciences

[2] Here we use the most common definition of the resilience: the ability of a system/community/society/defence to react to and recover from the damaging effect of realised hazards. www.floodsite.net

researchers have to be in contact to describe as well what is a flood resilient system including hydraulic data and stakeholders interactions. For instance, the workshops are conducted in three parts and focused on the Bièvre River basin; the territorial diagnosis, including flood protection and prevention measures and tools; strategies elaboration, that is to say the elaboration of combination of structural and individual solutions of flood protection and/or vulnerability reduction depending on the foreseen projects of urban development; and the assessment and rating of the scenarios. These workshops are an example of the combination of hard sciences methodology with the territorial diagnosis and the use of models to develop the scenarios and at the same time human sciences methodology to organize into a hierarchy the scenarios and to integrate all stakeholders including inhabitants in the process. Through this project I find how I can investigate the landuse in flooding areas and what question has not been explored by researchers.

The resulting topic

The landuse in urban area has to be linked with the regulatory policy. Indeed, the risk prevention plans are the tools used by the central state services to control the urbanism in these vulnerable areas. These documents establish the constructible areas (with some instructions to take into account) and the non-constructible areas. The risk prevention plan is included in the city master plan, so the mayor has to take it into account when he issues planning permissions. The management of flood risk is constituted by others documents concerning prevention, management of the crisis, etc. The first question is: why, despite regulation, there is still building in floodplains. To us, it's maybe in the application of the regulation by stakeholders, that we will find some of the flaw of the flood risk management. We want to study the amount of risk taken by those involved in planning.

At the beginning of my PhD project, we developed some questions, which appeared to us as key points in our reflection. We wanted to identify which step of the development of a building project is the key moment to integrate the flood risk issue, that is to say at which time the flood risk appeared in the debate around the development of the project. What is the good governance around the project, which enables the risk integration? Who are the stakeholders' driving this process? How is built the speech about the improvement of the resilience and the reduction of the vulnerability. Are these concepts openly mentioned or are they underlying? To answer to these questions we planned to take into account different scales of landuse project: the building, the plot, the district. This approach enables us to observe if the integration of the risk rises crescendo along the project or if it progressively disappears of the stakeholders' speeches and actions.

The progress of the SMARTeST project allows us to enrich this PhD project and to develop a method applied to human sciences and especially to urbanism and landuse.

MATERIAL & METHODS: THE URBAN PROJECT, HOW TO APPROACH THE INTEGRATION OF THE RISK

Here we have to define what we hear with the concept of urban project, the central point of this PhD research.

The flood context of the Greater Paris

In this article we will mostly focus on the Seine River, it is characterized by slow rise of the river; and as a matter of fact the river may take several days or even weeks to recover its initial

level. Most of the rivers have the same hydraulic context as the Seine River; however some as the Bièvre River are characterized by flash floods. The table 1 below presents the eight biggest floods since 1910; we notice that any floods occur in recent years concerning the Seine River.

Table 1: The eight biggest flood events since 1910. Source: Les Dossiers de La Seine en Partage, "Le risque d'inondation en Ile-de-France", 2005.

SEINE RIVER : THE EIGHT BIGGEST FLOODS SINCE 1910							
LES HUIT GRANDES CRUES							
	Montereau Fault-Yonne	Saint-Mammès	Melun	Corbeil-Essonnes	Paris Austerlitz	Chatou	Mantes-Limay
1910	5,28 m	7,96 m	6,40 m	6,15 m	8,62 m	27,74 m	8,13 m
1924	5,52 m	7,30 m	5,45 m	5,22 m	7,30 m	27,28 m	7,71 m
1955	4,66 m	7,40 m	5,43 m	5,56 m	7,10 m	27,03 m	7,51 m
1982	3,73 m	6,83 m	5,18 m	5,11 m	6,13 m	26,09 m	6,85 m
1988	2,90 m	5,76 m	4,13 m	4,00 m	5,35 m	25,52 m	6,61 m
1995	2,80 m	5,36 m	3,82 m	3,48 m	4,94 m	25,23 m	6,60 m
1999	2,67 m	5,56 m	4,04 m	3,77 m	5,19 m	25,06 m	6,35 m
Crisis point	3,10 m	5,94 m	4,38 m	3,91 m	5,21 m	25,15 m	6,71 m
d'alerte	3,00 m	5,00 m	3,40 m	3,00 m	3,20 m	23,70 m	5,25 m

The urban project: a way to understand the stakeholders' interactions

The urban project is born with the delegation of responsibilities from the global (central state) to the local (city) (Pinson, 2009). The central services used to proceed with a long term planning, whereas the elected representatives and town planners tend to act with uncertainties and pragmatic planning. The state urbanism was focus on central services (technical and administrative), whereas in the conduct of urban project the stakeholders networks involve public and private stakeholders, political and technical, expert and layman (Pinson, 2009). Most often an urban project involves working with a larger scale, e.g. the neighborhood.

Currently, in France and especially in the discussions about the Greater Paris development, a new concept appears: the project urbanism (l'urbanisme de projet). This concept means that the development of a city has to be thought through the urban project, which has to be free from the city and the regional (landuse) planning. This includes a special dispensation that is to say that the urban project doesn't have to take into account the city and the regional master plan.

In the case of flood risk awareness, this concept of project urbanism could be a good or a bad thing. Around the Greater Paris there are a lot of discussions and one of them it's: "We have to build in flooding areas because there are still free from buildings". So with the project urbanism, city planners could use the special dispensation included, to build in flooding areas without taking into account the risk in the development of a project. But on the contrary the concept could be a way to take the risk into account differently at a larger scale. Indeed, risk prevention plan deals with flood risk at the building scale, project urbanism could deals with flood risk at the district/neighbourhood scale.

To answer questions raised above, we have chosen the urban project approach and so we have chosen several urban projects and through its descriptions we will develop how the risk is taken

into account. We will interview all stakeholders taking part in the building of an urban project: contracting owner (elected representatives…) project manager (architects, town planners…), property developer, social landlords, central state services etc.

Urban projects selected

We have chosen the Greater Paris as our area of study, in order to continue the work begun with the SMARTeST project. Here we are going to describe the urban projects we selected. This list will perhaps change during our project, functions of information which information we can access. Indeed, some city planners or cities do not always agree with the diffusion of some information about the development of the projects. So the access of information (e.g. archives, plan, meeting report…) will shape the list of the selected projects.

The main project we are studying is a project called the Ardoines ("les Ardoines") located along the Seine River in Vitry-sur-Seine in the Val de Marne County (Fig.2). The Ardoines are integrated in an operation of national interest (Opération d'Intérêt National, OIN), which included 12 cities. It used to be an industrial wasteland, and now this area is in redevelopment and a public development authority (Etablissement Public d'Aménagement, EPA) is in charge of this redevelopment. This area is interesting because the public development authority brought together several experts to elaborate some guidelines to know how build in this flooding area and how take into account vulnerability, resilience and the management of the crisis. An architect drew up a master plan taking into account the risk and the vulnerability. It's a planning with three steps: the first one could be flooded by a 20 years flood, so it is occupied by a park; the second floor could be flooded by a 50 years flood, here there are some accommodation and activities, but the ground floor of buildings has to be unoccupied; and then the third floor could be flooded by a 100 years flood, it's occupied by the most vulnerable activity e.g. transport infrastructures. This master plan (Fig. 2) has to be tested by hydraulic models.

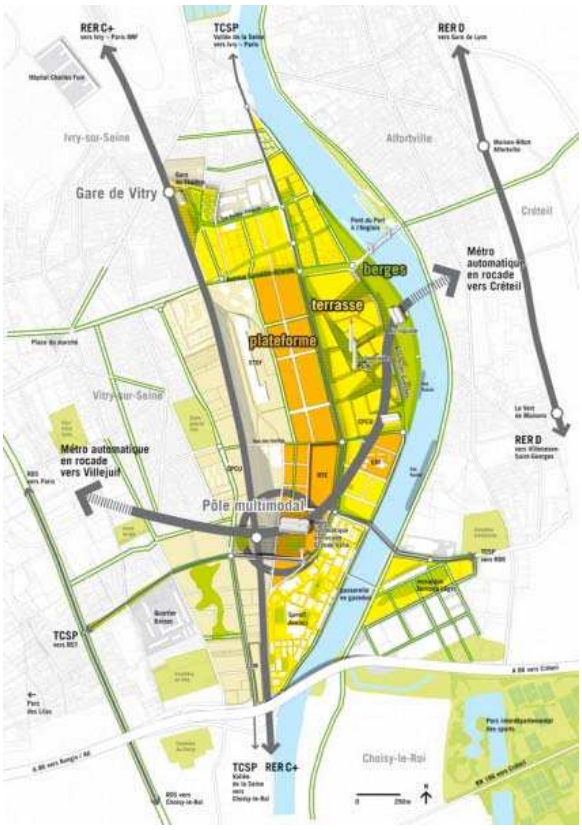

Fig. 2: The Ardoines master plan. Source: SEURA, 2009.

The second selected project is an eco-neighbourhood in the city of Ile saint Denis, in the Seine-Saint-Denis County. It's a farmer warehouse area and now the local authority has a redevelopment project in the city. The territory has got a lot of constraints because it's an island, but they decided to give more space to water in the neighbourhood. Here the question of the crisis management is relevant, but at this time this question it's not evocated in the project discussions.

The third selected project is Paris Seine Rive Gauche, a neighbourhood located between the Austerlitz station and the National library. It's a flooded area. During the construction of the building they did not take into account the risk. But yet they weatherproof some basements, for instance to protect the National Library books and archives.

We have selected others projects, we considered them as secondary in our study and as element of comparison. We have chosen an eco-neighbourhood in Mantes-la Jolie, a project of a lake dwelling in Neuilly-sur-Marne and an urban project called Ivry-Confluence. There are all urban projects in flooding areas and are in the study phase. Our investigations concerning these projects are not very advanced in terms of interviews and analyses. After around twenty interviews, our approach evolved but the urban projects stayed the middle of our reflection.

RESULTS AND DISCUSSION

The flood risk isn't a major issue in an urban project

Thanks to the interviews, the first result is that the risk is not taken into account by the stakeholders as a major issue in the discussions around the urban project. They apply the risk prevention plans but the flood risk is integrated as a constraint of the urban project. The elected representatives are afraid to communicate about the flood risk to the inhabitants. For instance, in the consultation about the development of the Ardoines project, there is little information about the risk concerning the area. Indeed, the elected representatives don't agree with the master plan, because a part of the area could be flooded by a 20 years flood and they don't accept that the city appears as a flooding city.

On the contrary, the river as the natural element is actually a rise in value element. The discussions around the Greater Paris promote the return of the city towards the river. A member of the Paris city hall says that high rise buildings have to be built along the Seine River, because more people could have a river view.

There is a gap between the landuse policy and the flood risk management policy. This gap could be reduced if the urban project is integrated in a territory and so is thought at a larger scale. Currently, the management of flood risk is limited to the application of the risk prevention plan.

Civil engineering: a way to integrate the flood risk

We observe that the non-integration of the flood risk issue is not because a technical problem; a lack of knowledge about the hazard or a lack of knowledge in the way to build taking into account the vulnerability and the resilience, but more because a non-integration by stakeholders. The risk prevention plan is not very efficient in dense area because this document concerns only new buildings. But despite twenty years of risk prevention policy in the urban project only the risk prevention plan is applied and comes down to civil engineering; e.g. stilts, ground reshaping,

build out of the high water mark, etc. It's a failure in the policy of flood risk management regarding all the documents concerning prevention and management of the crisis. The stakeholders taking part in urban project take the risk into account only through constructive measures and don't care about the management of the crisis.

CONCLUSIONS

Because of the real estate pressure, the concept of densification through the sustainable development and the fact that the river appears as an element of an urban project promotion, the risk is not considered as a major aspect of an urban project. Currently, we observe that the management of the flood risk is dissected in accordance with the sustainable development and the concept of densification. Indeed, the flood risk management is summarized as constructive measures, without thinking in terms of prevention and crisis management. But in case of flood, who will be responsible for the damages?

Nowadays the human sciences try to "do science" to the side of hard sciences. They appropriate technical subject related to environmental sciences as the flood risk. But they chose others entry points as the urban project and others subject as the interactions of the stakeholders. To the scientific community the human scientists' methodology isn't real sciences and could be compared with the work of the journalists. Through projects bringing together human and hard scientists, the understanding and the exchange of way of "do sciences" may be rewarding for each.

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